Types / classification of Irrigation.

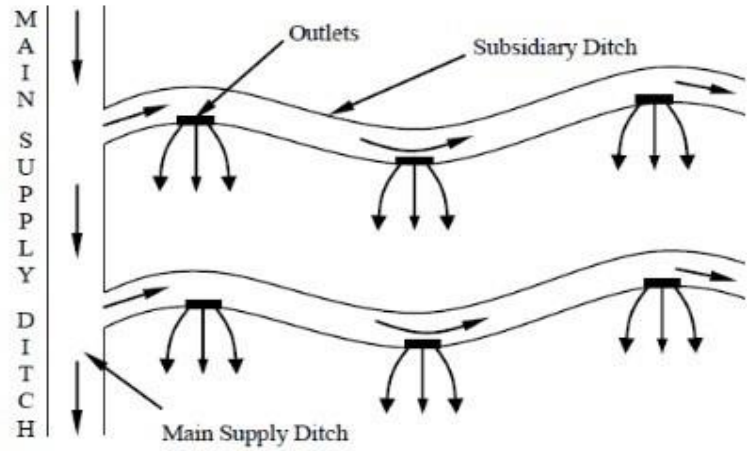
- Surface Irrigation
  (Water is applied directly on ground surface.)
  - Flow Irrigation
    (Water flow freely due to action of gravity)
    - Perennial Irrigation
      - → Controlled Irrigation
      - → Water is applied to crops throughout the year.
    - Flood / Innundation Irrigation.
      - → Uncontrolled Irrigation
      - → In this agricultural land is kept flooded or submerged
  - Lift irrigation
    (Water is applied to plant by pumping it using manual or mechanical means.
    e.g → Handpump, tubewell)
- Sub-surface Irrigation.
  (Water is applied directly at the root zone of plant.)
  - Natural Subsurface Irrigation
    - → Water is applied in root zone of plant due to seepage from adjoining canals or water bodies.
  - Artificial sub-surface Irrigation.
    - → Water is applied in root zone of plant by using a pipe network

Wild/Free flooding

- Water is applied to the land, through ditches excavated either on contour or up and down a slope.
- Usually ditches are 20 to 50 meters apart depending upon the slope, soil texture and types of crops sown.

Suitability

- When water is easily available in large quantities and is inexpensive.
- When land is rolling, irregular topography, where other methods are not feasible.
- Generally used for close growing crops, pastures



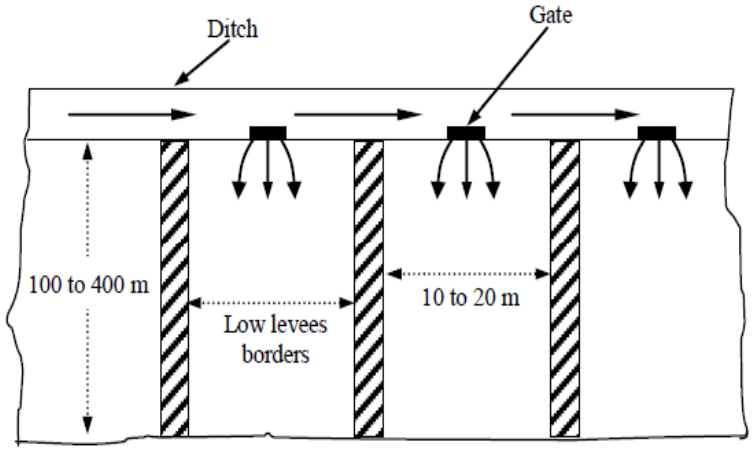
Rice irrigated with wild flooding method

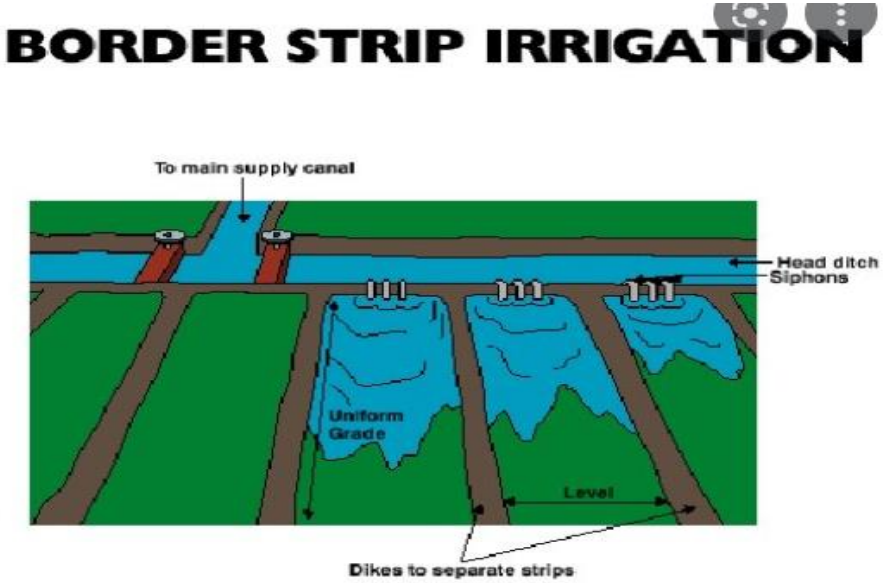
Wild/Free flooding

- **Advantages**
- Low initial cost of land preparation.
- Wastage of land is minimum.
- **Disadvantages**
- Chances of ponding may necessitate drainage.
- This method has lowest water application efficiency
- Non-uniform distribution of water i.e. excess irrigation in inlet region and insufficient irrigation at outlet end.
- Excessive soil erosion on steep slopes

Border Strip Method

- Land is divided into a number of strips with the help of low levees
- Each strip is generally of 10 to 20 m in width and 100 to 400 m in length
- Land is levelled perpendicular to flow to prevent concentration of water on either side of border
- Water supplied at the upper end advances towards lower end
- Supply of water is stopped once it reaches lower end
- Suitable for some close crops, row crops and orchards





Border Strip Method

Advantages

- Relatively easy, rapid and efficient.
- Low maintenance cost.
- Provides uniform wetting of soil compared to wild flooding.

Disadvantages

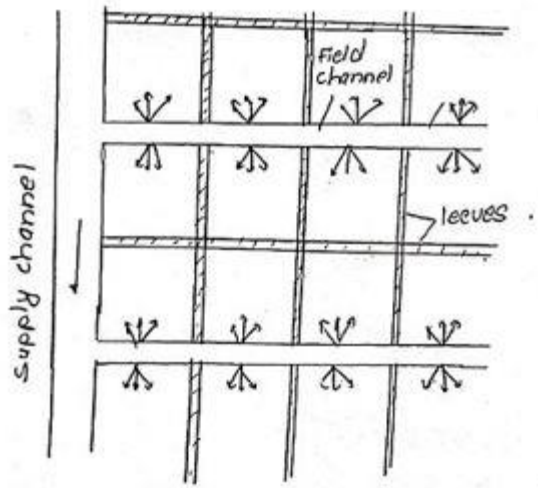
- Proper levelling or more unifrom longitudinal slope is necessary.
- High initial investment (cost) compared to free flooding.
- Water supply should be large.

Check Area Method

- Most common and widely practiced method in Nepal.
- Area is divided into small plots by low levees called as check areas.
- Check area varies from 0.2 ha to 0.8 ha.
- Levees are connected with cross levees at convenient places

Suitability

- Suitable for more permeable as well as less permeable soil
- Suitable method for cereal crops



Check Flooding

Check Area Method

Advantages

- Higher efficiency can be achieved compared to free and border flooding
- Good control over distribution of water.

Disadvantages

- Higher labour requirement compared to border and free flooding.
- Some loss of cultivable land due to leeves
- Levee interfere during operations
- Use is generally restricted to smooth levelled lands

Basin Flooding Method

- It is a special type of check flooding used for orchard farming.
- Basins are made around one or more trees in shape of square, circular etc. but circular is more common so called as Ring basin method.
- Basins are kept submerged.
- Water is supplied from ditch to each basin.
- Generally applied to level surface.

Suitability

- Suitable for orchard fruits and trees and also for close growing crops
- Rice is sometimes grown on fine textured, slowly permeable soil.

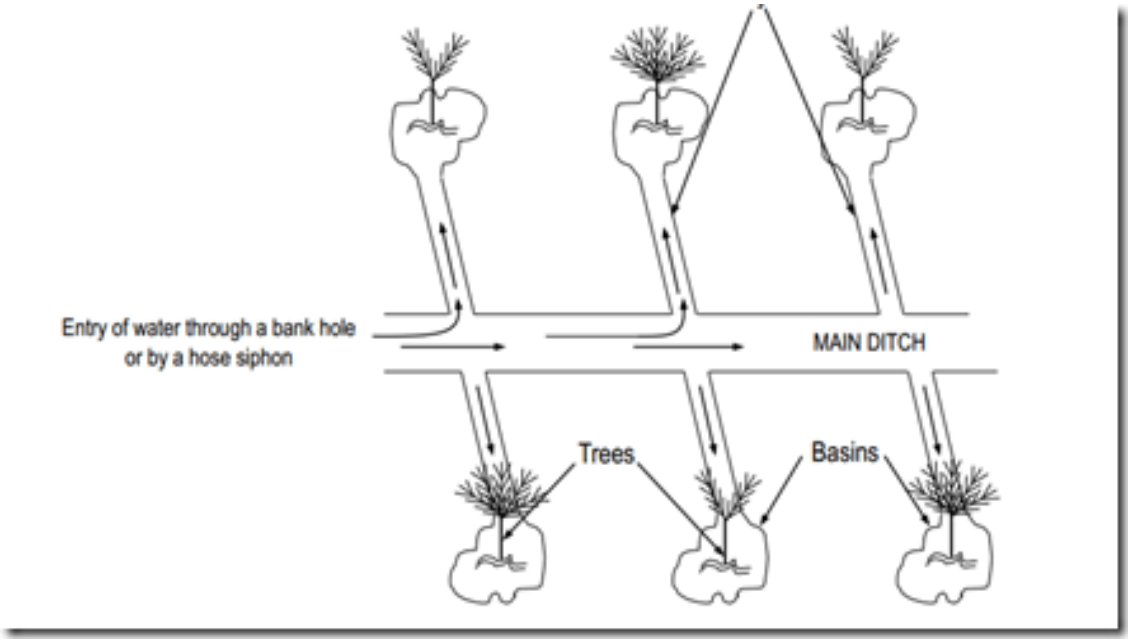
Advantages

- This method economise water considerably.

Basin Flooding Method

Disadvantages

- Initial cost of basin preparation is high.
- Not suitable for field crops.



Furrow Irrigation Method

- Furrows are narrow ditches excavated between rows of plants
- Furrow/ditches carry water and crops are planted on ridges.
- Depth of furrows varies from 8 cm to 30 cm and about 400 m long
- Water reaches to the root of the plants by percolation.
- Too long furrows may result in high percolation at upper end and too little water at down slope end
- About 20% to 50% i.e one-fifth to one half of the land is wetted by water.
- Results in less evaporation, less pudding of soil

Suitability

- Suitable for row crops like potatoes, onions etc.
- Suitable for Heavy soils i.e clayey soils having low infiltration rate

- **Advantages**
  - Low evaporation loss as only one-fourth to half of land is wetted.
  - Relatively cheap to construct and maintain.
  - Furrow/ ditch act as drain in the instance of heavy rainfall.
- **Disadvantages**
  - Farm machinery cannot be used.
  - Difficulty in land preparation.
  - Expensive in terms of time and labour cost.
  - Hazard of soil erosion

Drip/Trickle Irrigation Method

- Water is slowly and directly applied to the root zone of plants through the nozzles present in the pipe network buried under surface
- Water is applied drop by drop at the rate of 2 lit/hr to 10 lit/hr.

Suitability

- Suitable for any type of land topography.
- Suitable in water scarce area.
- Suitable for fruits, vegetables etc.

Advantages

- Reduces evaporation loss.
- Since, only necessary region of soil is wetted, fertilizer and nutrition loss are reduced.
- Growth of bacteria, fungi, pests and diseases that depend upon moist environment is reduced as above ground plant parts are dry.
- Reduction of growth of unnecessary weeds for ground that is not wetted.

Drip/Trickle Irrigation Method

- Greater control over irrigation rates.
- No cultivation area is lost in making ditches.

Disadvantages

- High initial cost.
- Possibility of frequent clogging of nozzles, drippers.
- Changes in crops may result in frequent replacement of trickle lines and spacing of nozzles.

Sprinkler Irrigation Method

- Water is sprayed to crops through network of pipes and pumps.
- It is a type of artificial rain so good for crops.

Suitable

- Suitable for any type of land Topography.
- Suitable where W.T is high.
- Suitable for light soil having high infiltration rate.
- Suitable for fruits, vegetables, coffee, tea etc.
- Suitable at water scarce area.

Advantages

- Land levelling is not required.
- Fertilizer may be introduced in irrigation water.
- Having high water application efficiency of (80-85) %.

Sprinkler Irrigation Method

- No cultivation area is lost in making ditches
- Uniform application of water.

Disadvantages

- Strong wind disturbs the sprinkling pattern.
- Not suitable for crops with high water requirement
- Initial cost of the system is high
- Clear water (sand and silt free) is required for the system
- Not suitable for heavy soil having low infiltration rate.

History of Irrigation Development in Nepal

- **Primary phase (before 1956)**

-Raj Kulos during Licchavi and Malla period

-Special contribution of King of Gorkha (Ram shah) in irrigation management

-Chandra canal developed by Chandra Shamsher in 1928 (1985 B.S) was the first canal of Nepal in Saptari district.

-Judha canal in Sarlahi , Jagadispur irrigation in Kapilvastu etc.

- **Infrastructure development phase (1957-1970)**

-Irrigation project were built with co-operation from india and Usa

-Budhanilkantha irrigation system in Kathmandu valley, Vijaypur irrigation system in Pokhara Kamala and Hardinath in Dhanusha.

-Koshi and gandak treaties with india.

History of Irrigation Development in Nepal

- **Intensive development phase (1970-1985)**

Co-operation with Multilateral donor agencies like world bank and ADB

-Development of Kankai and Mahakali-I irrigation project

-Hill irrigation project started

- **Integrated development phase (1986-Date)**

-Development of babai irrigation, Mahakali-II, bagmati irrigation etc

- Water resource act and Irrigation Policy were first developed in 1992 (2049 B.S) with the vision of irrigation development
- Later amendments were made in various periods and currently Irrigation Policy 2004 (2070 B.S) is in practice
- Irrigation master plan 1990, Agriculture perspective plan 1995, Water resource strategy 2002 and National water plan 2005 are other documents which guide irrigation development in Nepal

Status of Irrigation in Nepal

- Total area=1,47,181 km2
- Total Cultivable area = 26,42,000 ha
- Total irrigable area = 17,66,000 ha

At the end of the fiscal year 2076/2077, out of the total irrigated land, the area covered by different methods is as follows:

- surface irrigation=10,02,746 ha
- Sub surface irrigation=4,79,882 ha
- Total irrigated area=14,82,298 ha
- Farmer water course=2,80,041 ha